The Use of 'Excess' Pension Fund Earnings to Provide Inflation Protection for Private Pensions

Ontario
Economic
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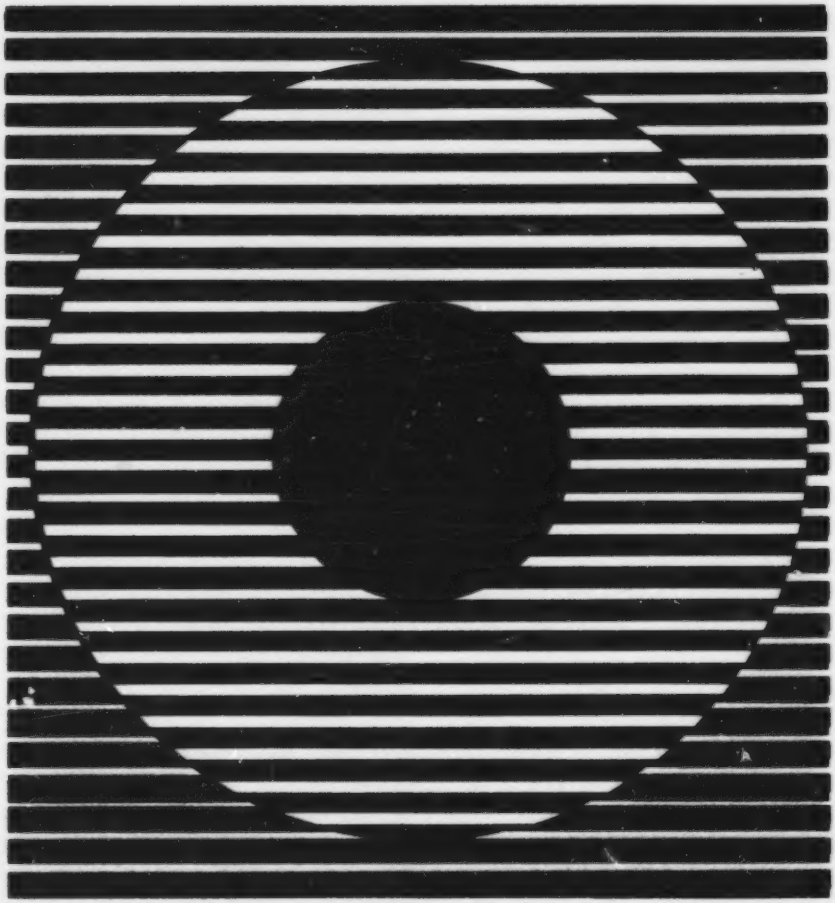
James E. Pesando

Discussion Paper Series



THE USE OF 'EXCESS' PENSION FUND EARNINGS TO PROVIDE INFLATION PROTECTION FOR PRIVATE PENSIONS

by James E. Pesando

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1
INTRODUCTION

Most members of private pension plans in Canada are members of defined benefit plans. Each member is promised a pension that is based on either earnings and years of service or a fixed dollar amount for each year of service. Pensions represent an important fringe benefit, and workers presumably forgo current wages in return for pensions promised by the firm. Workers are <u>not</u> promised any preset return on their own or their employer's contributions. They receive instead the pension benefit defined under the terms of their plan. The firms which sponsor the plans bear the investment risk. Inflation has increased over the past decade or so, and has two important effects. First, the nominal or fixed-dollar pensions promised by most defined benefit plans are - if not updated by firms - likely to be seriously eroded in real terms. Second, as interest rates in the marketplace have risen in response to inflationary pressures, the nominal returns on pension funds have increased. In many instances, the returns on pension funds have exceeded the valuation rates used by firms to establish required contributions to their plans. Firms have often used these surplus pension earnings either to reduce their contributions or to improve their pension benefit formulas.

The private pension system in Canada has been the subject of extensive review during the past few years. The federal Task Force on Retirement Income Policy (1979), the Economic Council of Canada (1979), and the Royal Commission on the Status of Pensions in Ontario (1981) have completed major studies, and a Green Paper on pension reform has recently been tabled in Parliament. All the studies published so far have identified the lack of <u>contractual</u> inflation protection in private pension plans as perhaps their most serious limitation. In Canada in 1980, 98.3 per cent of the pension plans in the private sector (covering 95.1 per cent of plan

members) had no formal provisions to provide cost-of-living adjustments (Statistics Canada 1982). If inflation averages 6 per cent the real value of an unindexed pension falls to 42 per cent of its initial value after fifteen years. At 10 per cent inflation it falls to 24 per cent of its initial value. Most large firms in Canada have made substantial adjustments to the pensions paid to their retired plan members (Tomenson-Alexander Associates 1978, Financial Executives Institute Canada 1980). Nonetheless, the emerging consensus is that a formal means of providing inflation protection for private pension plans is necessary if these plans are to play an important role in Canada's retirement income system.

This paper examines the methods by which private pension plans can provide inflation protection. The analysis focuses only on pensions due on the employee's retirement date; it does not deal with pensions being earned by still-active workers.

There are two basic approaches to extending inflation protection to the retired members of employer-sponsored pension plans.[1] The first is to require that private plans provide fully indexed pensions. This reform would require a parallel initiative by the federal government, such as the issuing of index bonds (Pesando and Rea 1977, Pesando 1979). The second approach is to require plan sponsors to use pension fund earnings above a statutory real interest rate of, say, 3½ per cent to enrich the pensions being paid to retired plan members. This approach, which is called 'excess interest' or 'performance indexing', has received considerable attention in recent years. It appears likely to be adopted in some form. The Canadian Association of Pension Supervisory Authorities (1982) or CAPSA, has recommended its adoption. Significantly, so has Ontario's Select Committee on Pensions (1982) in its Final Report.

The purpose of this discussion paper is to clarify as yet unanswered questions regarding the implementation and the likely success of an excess earnings approach to inflation protection. It addresses five important questions:

- the effects of placing floors or ceilings on the size of the cost-of-living adjustments provided by an excess earnings scheme;

1 Most such plans are 'defined benefit plans', in which the employee receives a benefit equal to a given fraction of average earnings or of final earnings for each year of service, or a fixed dollar amount for each year of service.

- the degree of inflation protection (properly defined) that would be provided, and its dependence on the asset mix of the pension fund;

- the cost of introducing an excess earnings scheme, and whether the cost would be borne by workers (in the form of reduced wages or other compensation), shareholders of the firm, or both;

- additional design issues, including the possibility of using a 'benchmark portfolio' to define excess earnings; and

- a brief evaluation of the excess interest scheme 'sketched' by the Ontario Select Committee on Pensions, which is similar in spirit to the more detailed proposal put forward by CAPSA.

The first part of the discussion paper, which focuses on possible floors or ceilings on the cost-of-living adjustments provided by an excess earnings scheme, is necessarily somewhat complicated. The objective is to note that a worker who receives inflation protection through such a scheme may be viewed - at least in some circumstances - as owning a variable annuity, purchased for him or her by the firm. This result is important because variable annuities have been studied in the economics literature, so that the present analysis can draw upon previously established results.

In the following discussion the term 'inflation protection' is often used. There are two possible definitions of inflation protection. The first is to claim that a pension has good inflation protection if on average - and thus over the long run - its real value is preserved. The second is to claim that a pension has good inflation protection if, on a year-to-year basis, its real value is quite certain. The latter is the preferred definition suggested by economic analysis, which identifies the reduction in inflation uncertainty as the feature distinguishing an indexed from a non-indexed benefit (Bodie and Pesando 1982). The reader need simply note that, if the first definition is adopted, a pension might be viewed as having good inflation protection in spite of the fact that its real value may change by as much as, say 50 per cent from one year to the next. The second (and preferred) definition recognizes that an individual may wish to have the real value of the pension decline (or rise!) over time, but accepts that this issue is logically separable from the primary concern, which is that its real value be relatively certain and thus predictable.

- Finally, although the primary purpose of this paper is to clarify certain important issues in the implementation of an excess earnings scheme, some policy recommendations are set out in a concluding section.

2
POSSIBLE FLOORS AND CEILINGS ON COST-OF-LIVING ADJUSTMENTS

For simplicity, let the term 'base rate' denote the rate which will be subtracted from the return on the pension fund to identify excess earnings. Assume that this base rate is 4 per cent. Then earnings in excess of 4 per cent on the pension fund reserve established for retired plan members will be used to finance cost-of-living adjustments to the pensions being paid to these retired workers.[2] The degree of inflation protection provided clearly depends upon the performance of the fund. If (1) there is no nominal floor in the excess earnings scheme (i.e. the nominal value of pension is reduced if the return is less than 4 per cent) and (2) there is no real ceiling (i.e. the real pension benefit actually increases if fund earnings in excess of 4 per cent are more than sufficient to provide full inflation protection), then the excess earnings scheme replicates a standard variable annuity.

In a standard variable annuity, an assumed interest or valuation rate in conjunction with the startup capital is used to set a base annuity payment. Subsequent annuity payments then rise or fall as the return on the underlying assets exceeds or falls short of the assumed interest rate.[3] If

2 The Select Committee recommends that excess fund earnings also be used to update the deferred annuities due terminated vested employees. Substituting the words 'terminated' or 'inactive' for 'retired' would encompass these plan members as well.

3 Let A_0 be the startup capital, let RV be the annuity valuation rate, and let the annuity be payable with certainty for n periods. Then the base annuity payment (B_0) is

$$B_0 = A_0 RV(1 - (1 + RV)^{-n})^{-1}. \quad (1)$$

If R_t is the nominal return on the underlying assets in year t and B_t is the nominal annuity payment received at the end of year t, then

$$B_t = [(1 + R_t)/(1 + RV)]\ (B_{t-1}). \quad (2)$$

the valuation rate is equal to the base rate in the excess earnings scheme, and if (1) and (2) are satisfied, then providing plan members with inflation protection through excess earnings is equivalent to providing them with a standard variable annuity. If so, one can analyse the excess earnings proposal by drawing upon results already established for variable annuities.

In fact, those who advocate the use of excess earnings may have more complicated schemes in mind. One possibility is to introduce a nominal floor, so that nominal benefits are never reduced. If the return on the pension fund is less than 4 per cent, so that excess earnings are actually negative, the pension benefit is not reduced. Instead, the plan sponsor suffers an underwriting loss.[4] This possibility is motivated by the behaviour of most large firms, who tend to grant special permanent cost-of-living adjustments. A second possibility is to introduce both a nominal floor and a real ceiling. In citing options for pension reform in Canada, the Task Force on Retirement Income Policy (1979) considered an excess earnings scheme which contained a cumulative real ceiling as well as a nominal floor. The real value of any enriched pension could not exceed its initial level, and any excess earnings above the amount necessary to preserve fully the real value of the pension would be banked against future investment shortfalls. In addition, any underwriting losses incurred by the plan sponsor by virtue of the guaranteed nominal floor would be banked, would accumulate at a market rate of interest, and would represent a prior claim on future excess earnings. Only after any accumulated losses borne by the plan sponsor were repaid would excess earnings be used to enrich pensions in pay. Although Ontario's Select Committee is (perhaps deliberately) vague on details, its First Report does suggest that pensioners would not receive real benefit increases as a result of the introduction of an excess earnings scheme.

If the excess earnings scheme contains only a nominal floor, its analysis is straightforward. Since the plan sponsor must underwrite any investment shortfall, the firm would wish to avoid holding risky assets in the pension fund. If the pension fund reserve held only assets whose

4 Technically, the pensioner has a standard variable annuity plus a put option on the assets in the pension fund reserve, with a striking price equal to the valuation rate in the excess earnings scheme, or 4 per cent in our example. For a more formal analysis in this framework see Bodie and Pesando (1982).

return is very unlikely to fall below 4 per cent, then the presence of the floor is rendered meaningless and the excess interest scheme would simply duplicate a standard variable annuity. If the pension fund holds only Treasury bills or other short-term securities, and if the inflation rate remains above the 4 per cent base rate in the excess earnings scheme, the floor will probably never bind. If the pension fund holds common stocks, returns will be quite volatile, and the return on the fund may frequently fall beneath 4 per cent. If so, the nominal floor would bind, with the sponsoring firm experiencing an underwriting loss. Finally, if the inflation rate were to turn very low or negative, then the floor is likely to bind if the pension fund holds only Treasury bills. This fact draws attention to the potential difficulties of imposing a nominal floor on an excess earnings scheme without acknowledging the possibility (and hope) that the inflation outlook might be fundamentally improved in the years ahead.

If the excess earnings scheme has only a nominal floor, the plan member can never be worse off than if he were provided a standard variable annuity with the same valuation rate and base annuity payment. If the excess earnings scheme has both a nominal floor and a real ceiling, together with the banking provisions noted previously, this need not be the case. Intuitively, the banking provisions do permit the real (although not the nominal) value of the pension benefit to decline, while the real ceiling prevents the real value of the pension benefit from rising.[5] Alternatively, and unlike the case in which only a nominal floor exists, the plan sponsor - rather than the plan member - may benefit if the fund does well. In turn, this would reduce any disincentive for the plan sponsor to hold risky assets in the pension fund, a disincentive that clearly exists if only a nominal floor exists.

If the pension fund in our example has a very low probability of earning a real rate of return in excess of 4 per cent, it will not generate enough excess earnings to offset fully the impact of inflation, and thus the

5 Technically, the plan member has now sold a call option on the real earnings of the fund with a striking price equal to the base rate in the excess earnings scheme. Again, see Bodie and Pesando for a more formal analysis of this point. Note also the fact that if the floor as well as the ceiling were real, the pension benefit would be constant in real terms and the banking provisions would mirror the underwriting experience of a firm which provides a fully indexed pension.

ceiling is not likely to bind. If, in addition, the probability that the nominal return on the fund will fall below 4 per cent is also very low, the nominal floor will not bind. In this combined case, the more complicated excess earnings scheme will again collapse to a standard variable annuity. Since Treasury bills or other short-term securities are likely to provide relatively stable real returns of about 1 per cent (more on this later), the ceiling is not likely to bind if the pension fund reserve holds only bills or their equivalent. As noted before, the floor will probably not bind in this case as long as inflation remains high. One can thus conclude that an excess earnings scheme, if tied to Treasury bills or their equivalent, is likely to replicate a standard variable annuity. If the pension fund reserve holds risky assets, however, the floor and the ceiling become crucial in the design of the excess earnings scheme.

To sum up, most observers have not 'fleshed out' the crucial design features of an excess earnings scheme. These focus on the existence of floors or ceilings on the cost-of-living adjustments. In their absence, an excess earnings scheme is equivalent to a standard variable annuity. If the pension fund reserve holds only Treasury bills or their equivalent, an excess earnings scheme - even with a floor and a ceiling - is still likely to resemble a standard variable annuity as long as inflation remains high. If the pension fund reserve holds risky assets, then the floor and the ceiling are potentially of great importance.

3

COST OF LIVING PROTECTION: HISTORICAL SIMULATIONS

It is useful first to review the historical data on real returns for Treasury bills, long-term Canada bonds, and common stocks. Data for the period 1953-80 (Table 1) indicate that the mean real return on bills was 0.82 per cent, with a standard deviation of 2.02 per cent.[6] By contrast, common stocks had a higher mean real return of 7.97 per cent, and a much higher standard deviation of 17.02 per cent. The mean real return on long-term Canada bonds was actually negative during this period, reflecting the impact of unanticipated inflation, while its standard deviation was 7.60 per cent.

The above data suggest the following. If a variable annuity is to provide a predictable real retirement income, it must be backed by a portfolio of Treasury bills or short-term bonds. Only then will the real return on the underlying assets be stable and excess earnings closely track the inflation rate. The real value of the pension benefit will be preserved on average only if the base (valuation) rate in the excess earning scheme is equal to the expected real return on the pension fund (Bodie and Pesando 1982, Rea 1981). For bills, this is about 1 per cent. Thus, if excess earnings are to track inflation closely and be sufficient on average to offset fully the impact of inflation, the excess earnings scheme must be bills-based and have a valuation rate of 1 per cent. If the scheme is bills-based but has a valuation rate of 4 per cent, the real benefit on average will decline at 3 per cent a year.[7] If the pension fund

6 Because nominal interest rates can never be negative, it is useful to restrict the sample period to those years in which the inflation rate was positive. The inflation rate as measured by the Consumer Price Index was last negative in 1952.

7 Let i_t be the real return on the fund in period t, and let b_t equal

TABLE 1
Real rates of return, 1953-80, Treasury bills, bonds, and stocks

	91-day Treasury bills	Long-term Canada bonds	Common stocks	Inflation (CPI)
1953	1.71	3.61	2.72	0.0
1954	0.83	9.20	38.46	0.60
1955	1.32	-0.61	27.32	0.30
1956	-0.17	-6.45	8.90	3.10
1957	1.58	4.08	-22.37	2.15
1958	-0.26	-8.17	28.16	2.52
1959	3.39	-5.84	3.04	1.37
1960	1.83	5.56	0.33	1.35
1961	2.68	9.48	32.41	0.13
1962	2.42	1.42	-8.70	1.59
1963	1.70	2.66	13.50	1.83
1964	1.79	4.48	22.96	1.93
1965	1.05	-1.87	3.57	2.90
1966	1.39	-1.92	-10.28	3.55
1967	0.48	-5.99	13.32	4.14
1968	2.09	-4.37	17.53	4.09
1969	2.50	-6.47	-5.29	4.58
1970	4.46	19.67	-5.01	1.46
1971	-1.41	5.98	2.84	5.04
1972	-1.46	-3.76	21.14	5.09
1973	-3.34	-6.78	-8.70	9.12
1974	-4.13	-12.48	-34.76	12.46
1975	-1.91	-6.09	9.31	9.48
1976	2.88	11.99	4.82	5.82
1977	-1.98	-3.32	0.43	9.50
1978	0.23	-6.56	19.25	8.43
1979	1.76	-11.14	31.64	9.76
1980	1.42	-8.22	16.83	11.21
Mean	0.82	-0.78	7.97	4.41
Standard deviation	2.02	7.60	17.02	3.67

NOTE: Data are drawn from C.G. Carlton, D.D. Ezra, and K.P. Sharp, 'Canadian investment returns and other economic statistics, 1926-1980,' where details regarding the calculation of the individual series may be found. The annual return on Treasury bills is obtained by the successive purchase of 91-day Treasury bills at the end of each quarter.

holds only stocks, then setting the base rate at (about) 7.5 per cent will provide a stream of pension benefits whose real value on average will be preserved. The real benefit paid in any given year, however, will be quite volatile.

Historical simulations for the period 1971-80 are presented in Tables 2 to 5 for a standard variable annuity, an excess earnings scheme with a nominal floor, and an excess earnings scheme with both a nominal floor and a real ceiling (and thus banking provisions). Four different portfolios are examined: bills, long-term Canada bonds, common stocks, and an efficiently diversified portfolio.[8] The startup capital in 1971 is $100,000, and annuity payments are made with certainty for ten years. The excess earnings schemes must, of course, be underwritten by a plan sponsor or life insurance company, and their cost may exceed or fall short of the startup capital. Two valuation rates, zero and 5 per cent, are used in the simulations. The former is a conservative estimate of the expected real return on bills or their equivalent, while the latter is typical of the rates actually used in the early 1970s to value defined benefit plans.

Consider first the bill results (Table 2). When the valuation rate is zero, the real benefit provided by the variable annuity declines from its base level of $10,000 to $9,473 in 1980, or 5.3 per cent. This erosion is very modest in view of the substantial unanticipated inflation that appears to have occurred in the 1970s. Because the nominal floor never binds, the results produced by the first excess earnings scheme are identical to those of the variable annuity. Because the ceiling binds in 1971, 1976, 1979, and 1980, while the floor never binds, the real benefits provided by the second excess earnings scheme are less than in the previous cases.

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the real benefit payment at the end of year t. Then:

$$b_t = [(1 + i_t)/(1 + RV)]\ (b_{t-1}). \qquad (3)$$

If $i_t = 0.01$ and $RV = 0.04$, the real benefit period t is expected to equal $(1.01)/(1.04)$, or 0.971 of the real benefit in period t-1; that is, it would decline at approximately 3 per cent a year.

8 An efficient portfolio has the minimum risk (variance) for a given return, or the highest expected return for a given level of risk (variance). The efficient portfolio created for the simulation experiments is the minimum-variance portfolio which has an expected real return of 3 per cent. The latter is an educated guess as to the expected real return on a portfolio of long-term Canada bonds. The purpose of the exercise is thus to focus on the reduction in risk if a pension fund holds this efficiently diversified portfolio rather than a portfolio of long-term Canada bonds.

TABLE 2
Alternative annuity designs: simulations for a bills-only portfolio, Canada 1971-80

Year	Inflation rate (%)	Return on treasury bills (%)	Variable annuity				Excess earnings scheme with nominal floor				Excess earnings scheme with nominal floor, real ceiling			
			RV=0		RV=5		RV=0		RV=5		RV=0		RV=5	
			Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
1971	2.9	3.6	10,360	10,068	12,778	12,418	10,360	10,068	12,950	12,585	10,290	10,000	12,950	12,585
1972	4.8	3.6	10,733	9,952	12,607	11,689	10,733	9,952	12,950	12,008	10,074	9,341	12,950	12,008
1973	7.5	5.4	11,312	9,757	12,655	10,915	11,312	9,757	12,999	11,212	10,618	9,158	12,950	11,169
1974	10.9	7.8	12,195	9,486	12,993	10,107	12,195	9,486	13,346	10,381	11,446	8,903	12,950	10,072
1975	10.8	7.4	13,097	9,197	13,290	9,333	13,097	9,197	13,651	9,586	12,293	8,632	13,115	9,209
1976	7.5	8.9	14,263	9,314	13,783	9,000	14,263	9,314	14,158	9,245	13,388	8,742	13,602	8,882
1977	8.0	7.4	15,318	9,261	14,099	8,524	15,318	9,261	14,482	8,756	14,378	8,693	13,913	8,411
1978	9.0	8.6	16,636	9,227	14,582	8,088	16,636	9,227	14,978	8,307	15,614	8,660	14,390	7,981
1979	9.1	11.6	18,150	9,260	15,498	7,907	18,150	9,260	15,920	8,122	17,425	8,890	15,294	7,800
1980	10.1	13.0	20,509	9,473	16,679	7,704	20,509	9,473	17,132	7,913	19,691	9,095	16,460	7,603

NOTE: The inflation rate is based on the consumer price index. Inflation and security data are from the Bank of Canada Review. The initial capital of the annuity is $100,000; the annuity is payable with certainty for 10 years; annuity payments are made at the end of the year; RV is the valuation rate used to cost the annuity.

Although not shown, there are excess funds in the 'bank' at the end of 1980, which are thus returned to the plan sponsor or life company. Again, the high degree of inflation protection merits note, as does the fact that the valuation rate of zero is far less than the valuation rates used by most defined benefit plans (more on this later).

When the valuation rate is 5 per cent (and thus the base annuity payment is much larger), the real benefit provided by the variable annuity declines steadily from $12,418 in 1971 to $7,704 in 1980. This result, as mentioned earlier, is a byproduct of the fact that the valuation rate considerably exceeds the expected real return on the bills portfolio. In effect, the expected real stream of annuity payments is tilted downward at its date of purchase. With a valuation rate of 5 per cent, the nominal floor binds in both 1971 and 1972 and thus the real benefits provided by the first excess earnings scheme exceed those provided by the variable annuity. This difference represents the shortfall absorbed by the plan sponsor or life company by virtue of its underwriting the nominal floor. Because of the banking provisions, which require that the plan sponsor be compensated for prior underwriting losses, the real stream of benefits provided by the second excess earnings scheme differs modestly from that provided by the first. In both schemes, real benefits decline steadily and regularly. The decline reflects the tilting implied by the fact that the valuation rate considerably exceeds the expected real return on the bills portfolio, while the regularity reflects the relatively low variance of real bill returns.

The sharpest contrast among the alternative annuity designs occurs with the riskiest asset base, which is common stocks (Table 3). Consider only the results when the valuation rate equals 5 per cent. Although this rate is less than the expected real rate of return on common stocks, the real benefits provided by the variable annuity, after rising somewhat, decline through 1977 and rise to exceed their initial level only in 1980. The sharp changes in the real value of the benefit payments throughout the period merit emphasis. These are simply a reflection of the inherent volatility of the returns on common stocks. The value of the nominal floor in the first excess earnings scheme is very high, as evidenced by the large real payments relative to the standard variable annuity. Plan members benefit when stock returns are high (1978-80), but are insulated from most of the adverse consequences when stock returns are low (1973-4). As noted previously, no plan sponsor is likely to be willing to hold risky

TABLE 3
Alternative annuity designs: simulations for a stocks-only portfolio, Canada 1971-80

Year	Inflation rate (%)	Stock returns (%)	Variable annuity				Excess earnings scheme with nominal floor				with nominal floor, real ceiling			
			RV=0		RV=5		RV=0		RV=5		RV=0		RV=5	
			Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
1971	2.9	8.0	10,800	10,495	13,320	12,944	10,800	10,495	13,320	12,944	10,290	10,000	13,320	12,945
1972	4.8	27.3	13,748	12,747	16,149	14,973	13,748	12,747	16,149	14,973	10,784	10,000	13,967	12,950
1973	7.5	-0.4	13,693	11,810	15,318	13,212	13,748	11,858	16,149	13,929	11,593	10,000	15,014	12,950
1974	10.9	-26.6	10,051	7,819	10,708	8,330	13,748	10,694	16,149	12,562	11,593	9,017	15,014	11,678
1975	10.8	19.7	12,031	8,448	12,207	8,572	16,456	11,555	18,410	12,928	12,558	8,818	15,014	10,543
1976	7.5	10.9	13,342	8,712	12,893	8,419	18,250	11,917	19,444	12,696	13,927	9,094	15,014	9,804
1977	8.0	10.0	14,617	8,873	13,507	8,166	20,075	12,137	20,370	12,315	15,319	9,262	15,014	9,077
1978	9.0	29.3	18,977	10,525	16,633	9,225	25,957	14,396	25,085	13,912	18,031	10,000	15,014	8,326
1979	9.1	44.5	27,421	13,990	22,890	11,678	37,508	19,137	34,521	17,613	19,608	10,000	15,014	7,657
1980	10.1	29.9	35,621	16,453	28,319	13,081	48,757	22,521	42,708	19,727	21,649	10,000	15,162	7,003

assets in the pension fund reserve if the excess earnings scheme contains only a nominal floor. Real annuity payments are stabilized to some extent by the second excess earnings scheme with a nominal floor and a real ceiling, although the banking provisions ensure that the plan sponsor is compensated for his underwriting activities. In 1973 and 1974, for example, annuitants are partially insulated from the precipitous declines in the stock market. When the stock market recovers in 1975, however, real benefits continue to decline as excess fund earnings are first used to repay the plan sponsors for the net underwriting losses they incurred in the previous years. By 1980, the real benefit is far less than that provided by the standard variable annuity. This is offset, however, by the higher real benefits provided during the period 1974 to 1977.

The additional tables, which show the results for a portfolio of Canada bonds (Table 4) and a representative efficient portfolio (Table 5), are largely self-explanatory. Two points merit note. First, the efficiently diversified portfolio consists of stocks (21 per cent), long-term Canada bonds (33 per cent), and Treasury bills (46 per cent). It is constructed to have an expected real return of 3 per cent, much like long-term Canada bonds. Its distinguishing feature is its lower variance, which is obtained through efficient diversification. Second, because of the very adverse performance of the bond market during this period, the bonds-based excess earnings schemes provide lower real benefits than those tied to the efficient portfolio. This result is consistent with the greater risk of the bond portfolio.

To sum up: the following conclusions are supported by the historical simulations. A bills portfolio or its equivalent is required if the real stream of annuity payments is to be stable. If this real stream is not to be tilted downward, then the valuation rate cannot exceed 1 per cent or so. If only bills or their equivalent are held in the pension fund, the design of the excess earnings scheme is of minor importance. If risky assets are held in the pension fund, the addition of a nominal floor (only) makes the excess earnings scheme very unattractive to the plan sponsor. If both a nominal floor and a real ceiling (together with banking provisions) are added, the real benefits are likely to be stabilized somewhat even if riskier assets are held in the pension fund. The plan sponsor is, however, compensated for underwriting the floor and ceiling, and his costs may actually be lower than if he provided a standard variable annuity.

TABLE 4
Alternative annuity designs: simulations for a bonds-only portfolio, Canada 1971-80

Year	Inflation Rate (%)	Return on Canada bonds (%)	Variable annuity				Excess earnings scheme with nominal floor				with nominal floor, real ceiling			
			RV=0		RV=5		RV=0		RV=5		RV=0		RV=5	
			Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
1971	2.9	11.3	11,320	11,001	13,727	13,340	11,320	11,001	13,727	13,340	10,290	10,000	13,325	12,950
1972	4.8	1.1	11,444	10,611	13,204	12,243	11,444	10,611	13,727	12,728	10,783	10,000	13,965	12,950
1973	7.5	1.7	11,639	10,039	12,789	11,031	11,639	10,039	13,727	11,840	11,592	10,000	14,552	12,551
1974	10.9	-1.6	11,453	8,909	11,985	9,323	11,639	9,054	13,727	10,678	11,592	9,016	14,552	11,318
1975	10.8	2.8	11,773	8,267	11,734	8,240	11,965	8,402	17,727	9,639	11,720	8,230	14,552	10,218
1976	7.5	18.5	13,952	9,111	13,243	8,648	14,178	9,258	15,492	10,116	13,888	9,068	14,552	9,502
1977	8.0	5.9	14,775	8,933	13,356	8,075	15,015	9,078	15,625	9,447	14,708	8,892	14,623	8,841
1978	9.0	1.3	14,967	8,301	12,886	7,147	15,210	8,435	15,625	8,666	14,898	8,262	14,623	8,110
1979	9.1	-2.5	14,593	7,445	11,965	6,104	15,210	7,760	15,625	7,972	14,898	7,598	14,623	7,458
1980	10.1	2.1	14,899	6,882	11,634	5,374	15,529	7,173	15,625	7,217	14,898	6,881	14,623	6,754

TABLE 5
Alternative annuity designs: simulations for an efficient portfolio, Canada 1971-80

Year	Inflation rate (%)	Return on portfolio (%)	Variable annuity				Excess earnings scheme with nominal floor				Excess earnings scheme with nominal floor, real ceiling			
			RV=0		RV=5		RV=0		RV=5		RV=0		RV=5	
			Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
1971	2.9	7.0	10,700	10,398	13,197	12,825	10,700	10,378	13,197	12,825	10,290	10,000	13,197	12,825
1972	4.8	7.8	11,535	10,695	13,548	12,562	11,535	10,695	13,548	12,562	10,784	10,000	13,548	12,562
1973	7.5	3.0	11,880	10,246	13,290	11,463	11,880	10,246	13,548	11,685	11,593	10,000	13,548	11,685
1974	10.9	-2.4	11,596	9,019	12,354	9,609	11,880	9,240	13,548	10,538	11,807	9,183	13,548	10,538
1975	10.8	8.4	12,523	8,794	12,754	8,956	12,878	9,042	13,987	9,822	12,798	8,987	13,548	9,513
1976	7.5	12.5	14,088	9,199	13,665	8,923	14,487	9,460	14,985	9,785	14,398	9,402	13,548	8,847
1977	8.0	7.5	15,145	9,156	13,990	8,458	15,574	9,416	15,342	9,275	15,478	9,358	13,548	8,191
1978	9.0	10.5	16,735	9,281	14,723	8,165	17,209	9,544	16,146	8,955	17,104	9,485	13,856	7,684
1979	9.1	13.9	19,062	9,722	15,971	8,145	19,602	9,997	17,515	8,932	19,481	9,935	14,899	7,598
1980	10.1	13.0	21,539	9,949	17,188	7,939	22,149	10,231	18,849	8,706	21,649	10,000	16,035	7,406

NOTE: The efficient portfolio, with an expected return of 3 per cent, has a standard deviation of 4.9 per cent. On the assumption that the expected real returns on Treasury bills, long-term Canada bonds, and common stocks equal 1.0, 3.0 and 7.5 per cent, and that the variances and covariances of these returns are those of the historical period 1953-80, the efficient portfolio consists of common stocks (21 per cent), Canada bonds (33 per cent) and Treasury bills (46 per cent).

4
COST AND COST INCIDENCE

The crucial determinant of the cost of an excess earnings scheme is the base rate. This is particularly clear when one sees that the excess earnings scheme is much like a standard variable annuity. The cost incidence is likely to be determined in large part by whether or not an excess earnings scheme is to be introduced retroactively; that is, on whether past as well as future service credits are to be subject to this type of inflation protection.

At present, the interest rates used to value defined benefit plans in Ontario tend to range from 4 to 7 per cent (Table 6). If an excess earnings scheme is introduced with specified base rate, the present value of a life annuity at normal retirement age calculated at this rate rather than at the plan's valuation rate will measure the increase in costs if the sponsor is already using fund earnings in excess of the valuation rate to make special cost-of-living adjustments. For a firm which has made no cost-of-living adjustments, the increase in cost is approximated by the difference between the present value of this annuity calculated at the base rate and the price at which the firm could purchase the annuity from a life insurance company. At present, life companies use an interest rate of about 14 per cent to price a life annuity for someone retiring at age 65.

How large in fact would these cost increases be? If one assumes (for simplicity) that those retiring at age 65 live for exactly 15 years, the calculations are straightforward. At an interest rate of 4 per cent, a fifteen-year annuity that pays one dollar at the end of each year costs $11.12. If the base rate in the excess earnings scheme is 4 per cent, this is the cost of each dollar of a pension which receives inflation protection in this manner. A firm using a 4 per cent valuation rate and also applying fund earnings above this rate to providing cost-of-living adjust-

TABLE 6
The interest rate assumption: plans supervised by the Pension Commission of Ontario

Year of survey	Plans in sample	Interest rate (%) Number of plans Interest less than 4	4-4 3/4	5-5 3/4	6-6 3/4	7-7 3/4	8 or above	Mean	Standard deviation	Mean yield on long-term Canada bonds (%)
1969	84	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	4.34	n.a.	6.10
1972	138	1	60	72	5	0	0	4.81	0.51	7.50
1975	128	0	37	70	21	0	0	5.10	0.52	7.88
1978	150	0	26	73	41	9	1	5.45	0.78	8.97

NOTE: These data refer to the latest (triennial) actuarial report approved by the Commission for self-administered (trusteed or insured deposit administration/segregated fund) plans with 1000 or more active members. The yield on long-term Canada bonds is the average interest rate during the three years prior to the survey date on Government of Canada bonds with ten or more years to maturity.

ments would experience no increase in costs. At 7 per cent, the cost of this annuity would be $9.11, or 19 per cent less. This difference would be the increase in cost for a firm using a 7 per cent valuation rate and currently making cost-of-living adjustments on the basis of fund earnings above 7 per cent. At 14 per cent, the cost of the annuity would be $6.14, or 45 per cent less than under the excess earnings scheme. This increase in costs would occur if a firm were making no special cost-of-living adjustments. In interpreting these numbers, one must of course remember that a reduction in the base rate increases not only costs but also the average degree of inflation protection.

To sum up: the potential cost increases are large if an excess earnings scheme is introduced, even if its base rate is as high as 4 per cent.[9] Cost increases will probably be particularly large for firms that have not been making special cost-of-living adjustments. To the extent that a firm has been making inflation adjustments on the basis of fund earnings compared to the valuation rate, cost increases will remain large for firms using valuation rates at the upper end of the normal range of 4 to 7 per cent.

Who will pay for these cost increases? Under a 'textbook' model of the labour market, in which workers in each period receive total compensation equal to the value of their labour services, the answer is straightforward. If excess earnings apply only to future service, then the ultimate incidence of any higher costs will be borne by workers. Workers will receive lower current wages (or reductions elsewhere in the total compensation package) than would otherwise be the case. This result stems from the fact that pension benefits, as deferred wages, are but a single part of the employee's total compensation. If excess earnings also apply to the past service credits, the ultimate cost of these retroactive pension enrichments will be borne by firms. As long as workers can leave the firm with their retroactively enriched benefits intact, they cannot be forced to forgo current wages in return for these prior benefit enrichments. This draws attention to one of the most troublesome aspects of an excess interest scheme or similar proposal. If the proposal is made retroactive, there may be a windfall gain to workers with past service credits at the expense of the shareholders of the firm. If the proposal is not

9 Further, the cost increases would be greater for deferred annuities, since the relevant life expectancies would be greater.

made retroactive, so as to avoid these windfalls, the effective degree of cost-of-living protection will increase only gradually over time. Workers with prior service credits could end up with hybrid pensions, with only those benefits accrued after the date of pension reform receiving cost-of-living protection. As noted later, the Select Committee appears to be well aware of this problem.

5 • ADDITIONAL ISSUES

The question whether only the interest income of the pension fund reserve should be used to identify excess earnings, and the related question whether risky assets should be valued at market if total returns are used, merit comment. The question whether the base rate should be subtracted from the return on each individual fund or from a benchmark portfolio must also be considered.

If only bills or their equivalent are held in the pension fund reserve established for inactive plan members, the first two issues are avoided. All the income of the fund would be interest income, because gains or losses on the portfolio would be negligible. If the fund held long-term bonds as well, the first issue would be whether to use only the interest income from this part of the portfolio. To do so would impart more stability to the measure of excess earnings, and thus more stability to the resulting cost-of-living adjustments. However, it would also ignore the economic reality that the use of only the interest income could seriously misrepresent the true status of the pension fund reserve. Suppose, for example, that long-term interest rates rose in anticipation of higher future inflation, thus depressing bond prices. The interest income on the bond portfolio would remain relatively stable, as would excess earnings if defined exclusive of capital gains or losses on the portfolio. In future periods, when inflation is expected to be higher (by assumption), interest income and excess earnings will remain at roughly their current levels. With higher inflation but unchanged excess earnings, the effective degree of inflation protection would be lower in future periods. By contrast, if a market return (i.e. inclusive of the capital loss) were used to define excess earnings, excess earnings could well be zero or negative in the year in which long-term interest rates rose. Cost-of-living adjustments

would thus be small or non-existent initially, but would be higher in subsequent periods to reflect the higher yield to maturity of the long-term bonds in the portfolio. The smoothing that occurs if only the interest income is used or if gains or losses are recognized but smoothed through some amortization procedure creates intergenerational risk-sharing among plan members. If a plan member retires at age 65, following a period of rising interest rates and unrealized capital losses on the bond portfolio, the expected degree of cost-of-living protection will be less than if such losses had been factored into prior measures of excess earnings as they occurred.

Clearly, the same logic extends to the case in which the pension fund reserve holds common stocks. To impart smoothness to the measure of excess earnings by amortizing gains and losses over extended periods is to require intergenerational risk-sharing across cohorts of plan members. This is neither correct nor incorrect from an economic viewpoint, provided the implication is understood.[10]

The discussion so far has assumed that excess earnings would equal the return on the individual pension fund reserve less the base rate in the excess earnings scheme. In the case in which the excess earnings scheme is adequately approximated by a standard variable annuity, the implication is that a fundamental metamorphosis of the pension plan occurs at the date that each worker retires (or becomes inactive). The plan is a defined benefit plan prior to this date but a defined contribution plan afterwards. The implication is that the role of the plan sponsor as fund manager disappears in the sense that only the worker, not the sponsor, has a proprietary interest in the pension fund reserve after he becomes inactive. This suggests that inactive workers (and perhaps active workers if there is to be intergenerational risk-sharing) should participate in the management of the pension fund reserve established for inactive plan members. (This does not imply, however, that active workers should participate in

10 The Teachers' Insurance and Annuity Association (TIAA), which manages one of the largest pension plans in the United States, offers its beneficiaries a variable annuity backed by a portfolio consisting largely of long-term bonds, mortgages, and other fixed-interest loans. The benefit is effectively smoothed, however, by the fact that unrealized capital gains or losses are ignored. As a result, there can be a cross-subsidization of different generations of annuitants. At present, for example, TIAA is paying a total nominal rate of return of 11 per cent to new retirees, which is well beneath the yield on long-term U.S. government bonds.

the pension fund reserve for active workers. Here the plan sponsor guarantees the defined benefit and alone stands to gain or lose as the fund performs well or poorly.)

Because firms would have considerably less incentive to manage the pension fund reserve for inactive workers[11] and because excess earnings - and thus inflation protection - might vary substantially between firms, many observers have argued that excess earnings should be defined as the return on a benchmark portfolio less the base rate. As the Select Committee notes in its First Report, this would preserve the incentives for plan sponsors to act as fund managers. This approach has the potential disadvantage of perhaps forcing risk-averse sponsors to duplicate the benchmark portfolio. If so, the choice of the composition of the benchmark portfolio might have an inadvertently strong impact on the allocation of funds in the capital market.

If a benchmark portfolio is chosen, its selection - in conjunction with the base rate - will be the key determinant of the degree of cost-of-living protection provided by the excess earnings scheme. If the benchmark portfolio consists of bills or their equivalent, and if the base rate is about 1 per cent, excess earnings will provide a very high degree of inflation protection in the sense that real pension incomes will be quite stable. If the benchmark portfolio consists of bills but the base rate is higher, real pension benefits will probably decline but at a fairly smooth rate. If the benchmark approach is adopted, certain issues pertaining to floors and/or ceilings and the treatment of capital gains and losses must also be addressed; the previous discussion is relevant to those issues. A potentially important limitation of the benchmark approach is that plan sponsors and their members lose the flexibility to trade off risk and expected return in the context of the desired stability of the real stream of pension benefits. This is the obvious consequence of using the benchmark portfolio together with a base rate to standardize excess earnings and thus cost-of-living adjustments between firms.

To sum up: the use of a benchmark portfolio preserves the investment incentives of the plan sponsor/fund manager with respect to the pension fund reserve for inactive members and also standardizes inflation

11 The term 'considerably less' is due to the fact that if the excess earnings scheme is not well approximated by a standard variable annuity, the firm may have incentives dictated by the floor and/or ceiling in the excess earnings scheme.

protection across plans. The choice of the benchmark portfolio then becomes an additional - and perhaps contentious - feature of the excess earnings scheme. The existence of a floor and a ceiling, the choice of the base rate, and the treatment of capital gains and losses remain crucial, as in the case where the return on each pension fund reserve identifies the excess earnings for that plan. Finally, as discussed in the next section, the presumption that a plan sponsor will be able to immunize the pension fund reserve from investment risk by holding the benchmark portfolio is more subtle than most observers realize.

6
PROPOSALS OF THE SELECT COMMITTEE AND CAPSA

As noted, the Select Committee recommends that excess earnings be used to augment the benefits of both retired and terminated vested workers. It recommends that the Pension Commission of Ontario develop legislation utilizing the excess earnings principle, with a phasing-in period to ease the cost impact. The latter proposal suggests that the legislation should be retroactive (i.e. prior service credits will also be subject to escalation via excess earnings), presumably to avoid the awkward problem of hybrid benefits.

The Select Committee discusses, although it does not actually endorse, an initial base rate of 6 to 7 per cent, to be reduced over time to an estimated real rate of 2 to 4 per cent. If an external measure or benchmark is employed, the Select Committee suggests that the average interest rate on long-term government bonds in recent years might be appropriate.

Consider first the choice of a base rate. If it is initially set at about 7 per cent, which is far in excess of the expected real return on any portfolio except one invested exclusively in common stocks, excess earnings so defined will on average fall short of the inflation rate. If the fund were invested in bills or their equivalent with an expected real return of about 1 per cent, excess earnings would on average fall about 6 per cent short of the actual inflation rate. Thus the real value of the pension benefits would decline at an annual rate of about 6 per cent, and would do so fairly smoothly. If the fund held a more risky portfolio (mortgages, short-term bonds) with an expected real return of, say, 2 per cent, excess earnings would fall about 5 per cent short of the inflation rate. The real value of the pension benefits would then decline at an annual rate of about 5 per cent somewhat less smoothly. In general, the

more risky the pension fund and thus the higher its expected real return, the smaller on average will be the decline in the real value of the pension benefits. However, the riskier the pension assets the more uncertain will be the real return on the fund and hence the less closely will the excess earnings so identified track the actual rate of inflation.

If the base rate is initially set at 6 or 7 per cent, the excess earnings scheme will probably just formalize the practice of the majority of large firms, which now grant special cost-of-living adjustments. For those firms which have not provided such increases in the past, the effective increase in the degree of inflation protection will be large. If the 2 to 4 per cent target level for the base rate is achieved, the degree of inflation protection - even for those firms now providing such adjustments - will rise sharply. Even if the pension fund reserve were to hold only the most conservative portfolio (i.e. Treasury bills or their equivalent), it would earn an expected real return of about 1 per cent.[12] If 3 per cent were the base rate, the inflation protection on average would fall about 2 per cent short of the inflation rate, but excess earnings would remain highly correlated with the actual rate of inflation.

If the interest rate - as distinct from the market return - on long-term Canada bonds were used as the benchmark portfolio, two fundamental problems would arise. First, inflation protection as measured by the year-to-year stability in real benefit payments would be poor, because the interest rate on long-term Canada bonds, especially if averaged over time, does not track the inflation rate very closely. As a result, excess earnings so defined would allow substantial year-to-year fluctuations in the real value of pension benefits. Second, and contrary to the presumption of most observers, a plan sponsor could not shed investment risk by holding long-term Canada bonds in the pension fund reserve, because the guide rate to define excess earnings is the interest rate or yield on long-term Canada bonds, not the return (i.e. inclusive of capital gains or losses) on these bonds. This result is easy to understand. If the long-term interest rate increases, the guide rate - and thus the measure of excess earnings - increases too. In fact, however, the actual return on a portfolio of long-term Canada bonds decreases because of the attendant

12 In 1981 the real return on Treasury bills exceeded 5 per cent, well above its long-run average. It would be inappropriate to extrapolate this unusual result into any long-term projection of the expected real rate of return on bills.

capital losses. If the plan sponsor held the benchmark portfolio, he would in effect be required to underwrite this capital loss.[13]

The suggestion put forward by Ontario's Select Committee is very close to the explicit proposal subsequently advocated by CAPSA. CAPSA proposes that excess earnings be used to provide inflation protection for pensions in pay, the deferred annuities due terminated workers, as well as for the accruing benefits of still-active workers in career-average and flat-benefit plans. Excess earnings are to equal the difference between a guide rate, equal to the five-year moving average yield on long-term Canada bonds, less a base rate equal to 3½ per cent for future (7 per cent for past) service. The present analysis has assumed that excess earnings would apply only to retired (or terminated) workers; extending it to still-active workers is beyond our scope. The major problem with the CAPSA proposal, as suggested, is with the proposed guide rate. To be satisfactory for both plan member and plan sponsor, the guide rate in the excess earnings scheme must satisfy two main criteria:

- excess earnings must track the inflation rate closely, so that the real value of the pensions so protected is predictable from year to year;

- the plan sponsor must have the option (whether exercised or not) to immunize from investment risk the pension fund reserve that is subject to excess earnings escalation.

13 The point is perhaps best seen with a simple numerical example. Assume the sponsor's fund is invested in consols, which trade at par ($1000) and bear a coupon rate equal to 8 per cent. Assume the expected real return is 3½ per cent and the inflation premium is 4½ per cent. Assume also that the benchmark portfolio consists exclusively of consols. Suppose that the expected inflation rate rises from 4½ to 9 per cent, so that the yield on the consols rises to 12½ per cent. This is accomplished by a decline in their price to $640. If the guide rate in the excess earnings scheme is simply the current yield on consols, and if the base rate in the excess earnings scheme is 3½ per cent, excess earnings rise to 12½ less 3½, or 9 per cent. This is exactly equal to the anticipated inflation rate and suggests - if anticipations are correct - that the plan member will receive full inflation protection. What is the significance of the capital loss of $1000 less $640 or $360? This is, in fact, an underwriting loss borne by the plan sponsor in spite of the fact that the fund simply replicates the benchmark portfolio. This results from the fact that the plan sponsor must pay excess earnings based only on the market yield on consols, without reference to the capital loss that occurs on his own portfolio as a result of the rise in long-term interest rates.

TABLE 7
Underwriting losses under CAPSA's proposal if the plan sponsor held the shadow portfolio of long-term Canada bonds, 1977-81

ASSUMPTIONS: Plan member with a pension of $10,000 retires at age 65 on 31 December 1976. Under an assumed life expectancy of sixteen years and the base interest rate of 3¼ per cent, the plan sponsor must place $120,094 in the pension fund reserve. The plan sponsor invests the entire pension fund reserve in long-term Canada bonds. In particular, the sponsor buys the 9¼s of 2001, which sell for 107 (i.e. $1,070) at year-end 1976. The sponsor thus purchases 112.24 bonds. For simplicity, the first of the annual pension payments is not due until year-end 1977.

Year	Guide rate	Annuity payment	Price of 9¼s 2001	Required fund	Actual fund	Special payment required
1977	8.66	$10,516	103	$121,117	$115,750	$ 5,367
1978	9.00	$11,094	96	$121,146	$112,960	$ 8,186
1979	9.26	$11,733	84	$120,885	$106,263	$14,622
1980	9.93	$12,487	77	$120,665	$111,982	$ 8,683
1981	11.09	$13,435	65	$120,936	$103,364	$17,572

NOTE: The required fund is the fund necessary to pay the current annuity over the remainder of the sixteen-year life expectancy at the base interest rate of 3¼ per cent. The actual fund equals initial fund plus interest less annuity payment less (plus) capital loss (gain). This is the market value of the fund at year end. The special payment required is the difference between the required and actual funds, thus returning the pension reserve to fully funded status. Payments are used to buy additional bonds at market prices.

By both criteria the CAPSA proposal is unsatisfactory. It does not provide good inflation protection. The five-year, moving average yield on long-term Canada bonds does not track the inflation rate very well. The result will be substantial year-to-year fluctuations in the real value of the pensions so protected. CAPSA implies that inflation protection is adequate if, on average and thus over long periods of time, the real value of pensions is maintained. As noted, this is not the most useful measure of inflation protection. Contrary to the explicit claim made by CAPSA, a plan sponsor cannot immunize the pension fund reserve from investment risk by holding the benchmark portfolio of long-term Canada bonds. To highlight this fact, the underwriting losses suffered by a plan sponsor who sought to immunize his pension fund reserve in this manner are shown in Table 7. The period 1977-81, in which long-term interest rates rose sharply, dramatizes the underwriting risks to which the plan sponsor would be exposed.

7
OVERVIEW AND POLICY RECOMMENDATIONS

The primary purpose of this discussion paper is to clarify some of the key issues which must be addressed if an excess earnings scheme is to be mandated for employer-sponsored private pension plans. The analysis does, however, support the following policy recommendations.

1 The specific proposal put forward by CAPSA, which is similar in spirit to the one implicit in the Select Committee's Final Report, is seriously flawed in the choice of its guide rate to define excess earnings. Use of a 5-year, moving average yield on long-term Canada bonds will allow real pension benefits to vary sharply from year to year and will not permit plan sponsors to shed investment risks in their pension fund reserves by holding the benchmark portfolio of long-term Canada bonds.

2 If inflation protection, properly defined as the removal of uncertainty regarding the real value of pension payments, is given high priority, the pension fund reserve established for retired plan members (or the benchmark portfolio) must consist of very short-term bonds, variable rate mortgages, or Treasury bills.

3 For a given pension benefit formula, the cost of introducing an excess earnings scheme is potentially quite large, especially if the plan sponsor had not previously been granting special cost-of-living adjustments. To prevent windfall gains for employees with past service credits at the expense of shareholders, it is appropriate to mandate excess earnings only for future service. Firms could be encouraged to provide some inflation protection for prior service credits, perhaps by excess earnings above a higher base rate as proposed by CAPSA.

4 If the pension fund reserve (or benchmark portfolio) held other short-term securities as well as Treasury bills, its expected real return would probably average 1½ to 2 per cent over the long run. A suitable compromise between risk and return on the pension fund, and between the cost and the preservation (on average) of real pension benefits, would be to set the base rate in the excess earnings scheme at 3½ per cent and require or encourage pension fund reserves established for retired plan members to hold this type of portfolio. Real pension benefits would decline on average at an annual rate of 1½ to 2 per cent and would not be subject to sharp year-to-year fluctuations.

5 If Recommendation 4 is adopted, the incorporation of floors and ceilings in excess earnings schemes is a less contentious issue. If Recommendation 4 is accepted, moreover, it would be unnecessary to legislate either floors or ceilings to excess earnings schemes.

8

APPENDIX: GLOSSARY AND EXAMPLE

GLOSSARY

Base annuity payment: in a variable annuity, the initial annuity payment determined by the initial capital and the valuation rate.

Base rate: the interest rate in an 'excess earnings' scheme used to define excess earnings to be used to provide inflation protection. If the base rate is 4 per cent and the pension fund earns 10 per cent, excess earnings equal 6 per cent. It is also sometimes used synonymously with 'valuation rate' for a variable annuity.

Benchmark portfolio: a variant of an 'excess earnings' scheme in which the return on a benchmark or external portfolio, not the return on each individual pension fund, is used in conjunction with the base rate to define excess earnings. Suppose the regulatory authorities chose a benchmark portfolio whose return in a particular period is 8 per cent. Then excess earnings are 4 per cent if the base rate is 4 per cent, regardless of the actual return on the fund to the plan sponsor who will be making the pension adjustments.

Defined benefit plan: a pension plan in which the member's pension is related to previous earnings and years of service or a fixed dollar amount for each year of service. For example, a final earnings plan may provide a benefit equal to 2 per cent of final earnings for each year of service.

Excess earnings: pension fund earnings in excess of the base rate in

the 'excess earnings' scheme.

Inflation protection: a means whereby pensions being paid to retired workers are adjusted to offset, either all or in part, the erosion in the real value of a fixed dollar pension caused by inflation. Inflation protection is viewed by economists as 'good' only if the real value of the pension is quite certain from one year to the next.

Nominal floor: said to exist in an 'excess earnings' scheme when the pension benefit is not reduced when the return on the pension fund falls short of the base rate. If the base rate is 4 per cent and the pension fund earnings are only 2 per cent, then the pension benefit would be reduced by 2 per cent in the absence of a nominal floor.

Real ceiling: said to exist in an 'excess earnings' scheme when the real value of the initial pension (base annuity payment) is not allowed to increase, even if 'excess' fund earnings would so permit. Suppose the base rate is 4 per cent, the fund earns 10 per cent and the inflation rate during the period is only 3 per cent. Then the increase in the base annuity payment would be limited to 3 per cent thus preserving its real value, in spite of the fact that excess earnings are sufficient to permit a 6 per cent increase.

Valuation rate: for a defined benefit plan, this is the interest rate used to cost the plan, that is, to determine the contributions necessary to ensure that sufficient funds accumulate to pay the promised benefit. For a standard variable annuity, this is the interest rate which - in conjunction with the initial capital - determines the base annuity payment.

Variable annuity (standard): an annuity (pension) in which the annuity payments rise or fall as the return on a particular fund exceeds or falls short of a predetermined valuation rate. If this valuation rate is 4 per cent, then the payment will be increased by 6 per cent at the end of the period if the pension fund earns 10 per cent during the period. If the pension fund earns 2 per cent, the payment will be reduced by 2 per cent. (See also n. 3.)

A SIMPLIFIED EXAMPLE

Suppose that a worker retires at age 65 and is entitled to a pension under the terms of a defined benefit plan of $10,000 per year. Suppose also that the worker will live on for ten years and receive a single pension (annuity) payment at the end of each year. The firm uses a valuation rate of 4 per cent to cost this benefit, and thus sets aside $81,108 in the pension fund.

Case 1: No inflation protection

The worker receives $10,000 in each of the ten years, regardless of the performance of the pension fund. If the inflation rate in the first period is 6 per cent, the real value of the pension drops by (about) 6 per cent, and so forth. If the pension funds earns more than the valuation rate of 4 per cent, the surplus is used by the firm to reduce its costs (or to improve pension benefits for still active workers).

Case 2: Inflation protection through 'excess' earnings

In the first period, the return on the pension fund is (say) 9 per cent. If the base rate equals the valuation rate of 4 per cent, then excess earnings equal 5 per cent. The amount of the pension at the end of the first period is increased by 5 per cent. (Because inflation is 6 per cent, its real value declines by 1 per cent.) If the fund earned 2 per cent, then excess earnings would be minus 2 per cent, and the amount of the pension would have been reduced by 2 per cent. If the pension fund earned 12 per cent, the amount of the pension would have been increased by 8 per cent, or by more than the rate of inflation.

Case 3: The employee is given a variable annuity with a base annuity payment of $10,000

This case is exactly the same as Case 2 on the assumption that the valuation rate for the variable annuity is 4 per cent. To buy this annuity, the firm must pay $81,108, just as before.

Case 4: Inflation protection through 'excess' earnings subject to a nominal floor

Same as Case 2, except that the amount of the pension is not reduced when the fund earns only 2 per cent.

Case 5: Inflation protection through 'excess' earnings subject to a nominal floor and a real ceiling

Same as Case 4, except that the amount of the pension is increased by only 6 per cent (i.e. the inflation rate) when the fund earns 12 per cent.

Case 6: Inflation protection through 'excess' earnings when the latter is defined by a benchmark portfolio

Suppose the regulatory authorities designate a benchmark portfolio consisting of, say, Canada bonds, which produces a 'return' of 8 per cent. Then excess earnings and the inflation adjustment are each 4 per cent, regardless of the return earned by the firm's own pension fund.

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